



Legal Investigations Virtual Environment

Version 1.0

Prepared by

Group Name: DroidArmy

Andrew Rhoden
Aundhrae Richardson
Craig McLaren
Teran Stone
Jeria Levy

andrewrhoden22@gmail.com
aundhrae.richardson@gmail.com
cmclaren89@gmail.com
teran.stone@mymona.uwi.edu
jeria_levy2000@yahoo.com

Instructor: Carl Beckford

Course: COMP 3901s

Lab Section: *Capstone Project*

Teaching Assistant: *Paul Gaynor*

Date: August 4, 2015

Contents

REVISIONS

1 INTRODUCTION

- 1.1 DOCUMENT PURPOSE
- 1.2 PRODUCT SCOPE
- 1.3 USEFULNESS OF PROBLEM
- 1.4 INTENDED AUDIENCE AND DOCUMENT OVERVIEW
- 1.5 DEFINITIONS, ACRONYMS AND ABBREVIATIONS
- 1.6 DOCUMENT CONVENTIONS
- 1.7 REFERENCES AND ACKNOWLEDGMENTS

2 OVERALL DESCRIPTION

- 2.1 PRODUCT PERSPECTIVE
- 2.2 PRODUCT FUNCTIONALITY
- 2.3 USERS AND CHARACTERISTICS
- 2.4 OPERATING ENVIRONMENT
- 2.5 DESIGN AND IMPLEMENTATION CONSTRAINTS
- 2.6 USER DOCUMENTATION
- 2.7 ASSUMPTIONS AND DEPENDENCIES

3 SPECIFIC REQUIREMENTS

- 3.1 EXTERNAL INTERFACE REQUIREMENTS
- 3.2 FUNCTIONAL REQUIREMENTS
- 3.3 BEHAVIOUR REQUIREMENTS

4 OTHER NON-FUNCTIONAL REQUIREMENTS

- 4.1 PERFORMANCE REQUIREMENTS
- 4.2 SAFETY AND SECURITY REQUIREMENTS
- 4.3 SOFTWARE QUALITY ATTRIBUTES

5 OTHER REQUIREMENTS

- 5.1 METHOD

6 IMPLEMENTATIONS

- 6.1 CHALLENGES
- 6.2 TESTING
- 6.3 DESIGN TRADEOFFS
- 6.4 DESIGN SCALABILITY

7 RESULTS

8 CONCLUSION

- 8.1 ASSESSMENT OF DEGREE OF SUCCESS

8.2 WHAT COULD HAVE BEEN DONE DIFFERENTLY

8.3 EXTENSIONS

8.4 LESSONS

Revisions

Version	Primary Author(s)	Description of Version	Date Completed
1.0	DroidArmy	Product MVP created to show the primary operations of application	03/08/15

1 Introduction

1.1 Document Purpose

This document's purpose is to give a detailed guide to any developer or engineer who will work on this project in the future. It is to give a full step by step manual of the system requirements for the "Legal Investigations Virtual Environment (LIVE)" system along with how DroidArmy set out to achieve these requirements. It is our aim that using this guide any competent developer will have no problem replicating, testing or developing this system. It is also to be used by the clients for which the system will be developed as a method of presentation of the requirements that the system will be given and procedures employed in its development.

1.2 Product Scope

The product being specified is called "Legal Investigations Virtual Environment" (LIVE). LIVE is geared at providing support for and increasing the efficiency of law enforcement, legal and investigative operations and services. A key benefit of the system will be the detection of patterns and similarities among case reports in a database that are easily overlooked or extremely hard to establish. Another important benefit will be to enable users to share and access data across the entire geographic area covered. In so doing, it also aims to eliminate occurrences of miscommunication, lack of awareness and duplication of processes. Voice to speech has been included to allow for faster searching and data entry of the system. The background search tool will be a key component of the application as it increases productivity and effectiveness. Its primary intended user interface is provided via internet access through a web browser. A secondary user interface will be a mobile application to be developed for the Android Operating System. Which will enable ubiquity in the ability of users to access the application and its functions.

1.3 Useful Of Problem

In order for police officers to be better able to organise and match similar reports, a paper based system is not sufficient to efficiently tackle this task. Officers must be able to carry out their duties without the time lag of filing reports or searching them.

The proposed system will consist of a web and mobile based application which aims to facilitate a voice to speech system for search as well as for logging files. The forms will take the layout of the generic police reports and have the option to attach additional information such as who can view the report. Instead of having to fully write or type reports, this system will have prerecorded key words for various categories on the police form. LIVE will then match speech to recordings and fill the relevant areas with matched words. The system will also run searches faster as well as group reports that have similarities based on predefined keywords and categories. This is made possible using an algorithm that will perform searches in the background intermittently. When matches of similar reports based on the search criteria are found an alert is generated and sent to the relevant user(s).

1.4 Intended Audience and Document Overview

This document's intended audience are the clients for which the L.I.V.E. system will be developed and its verifying body which includes, the Ministry of National Security of Jamaica, Commissioner of Police, Deputy Commissioner of Police, Assistant Commissioners of Police and Senior Superintendents of the J.C.F. This document will serve as a reference to these clients and demonstrate the functionality of the system and its development to their satisfaction. It is also intended for the lecturers supervising the Capstone Project Course (COMP 3901) at the University of the West Indies, Mona who will be reviewing the content of the document, analyzing its progress and quality. Also the developers of L.I.V.E who will use the document to keep track of their progress and the requirements of the system being undertaken. This document details the development process that will be undertaken to establish and build the different aspects of L.I.V.E. Its sequential ordering displays the pattern for which it is to be read and makes reference to relevant sections and content to be viewed throughout the document.

1.5 Definitions, Acronyms and Abbreviations

G.U.I. - Graphical User Interface

I.E.E.E. - Institute of Electrical and Electronics Engineers

J.C.F. - Jamaica Constabulary Force

L.I.V.E. - Legal Investigations Virtual Environment

1.6 Document Conventions

In general this document follows the requirements of the COMP3901 course. It uses Arial font size 11, or 12 throughout the document for text. Use italics for comments. Document text should be single spaced and maintain the 1" margins found in this template.

1.7 References and Acknowledgments

Grant N, Morgan LW, Henry D, Heywood N, Morris M, Coe J, Smith E, Williams MJ, Thompson P, Grant LG, et al. 2008. Citizens' Charter Jamaica Constabulary. jamaicanpolice.com/ [Internet]. [cited 2015 Aug 5]. Available from: www.jamaicanpolice.com/constabulary-citizens-charter.pdf

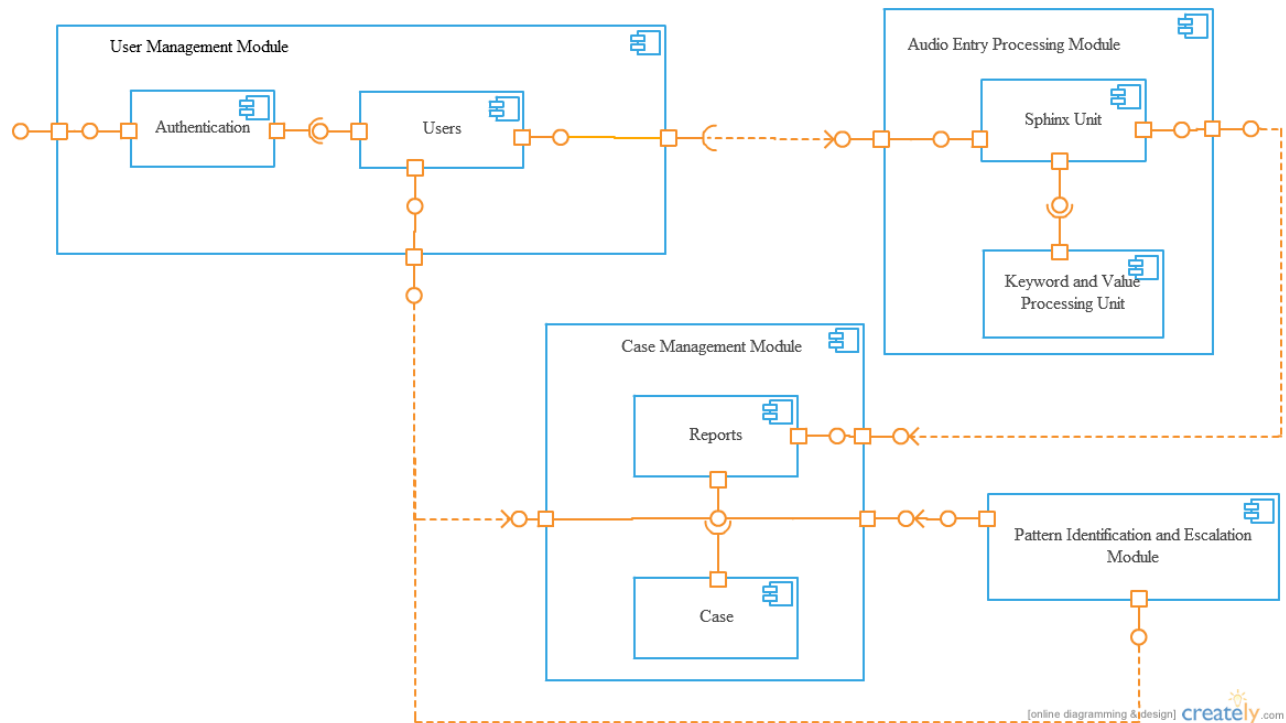
Henderson D. 2013. JAMAICA CONSTABULARY FORCE (JCF) Crime Reporting and Case Management Policy. Kingston. Jamaica Constabulary Force.

2 Overall Description

2.1 Product Perspective

This system will be a replacement for the current system being utilized by the JCF to log, keep track of, correlate and identify links and trends among cases and reports. The current system utilized by the JCF includes an application referred to as Crime Intelligence Management System (C.I.M.S.) This system enables searching by paragraph through case files, reports and records to identify user specified search criteria. It provides links to case files and reports that may be relevant to the user's search. It however results in long wait times for searches to complete, is only accessible through a private network via a single computer at the division's office and as such is restricting as it relates to accessibility. They also employ the use of open source management tools such as Google Drive, Google Sheets, Google Forms and Dropbox to keep information synchronized between the different departments. There is a lack of training offered to officers to familiarize themselves with the current system. The intended system, L.I.V.E. will offer the ability to compile and assess similarities between cases and reports along with keeping log of the reports and data from the different divisions of the police force. Instead of leaving all searches and pattern identification to the users of the system, the application will carry out this task through self propagation. The system will therefore contain a case management module for reports and case logging and storage. It will also provide the pattern identification tool along with a user management module for the identification of patterns and escalation of these patterns to the relevant users. Also the implementation of audio entry and processing tool for the translation of sound based entry, to text.

Below provides a component based model of the intended system (L.I.V.E):

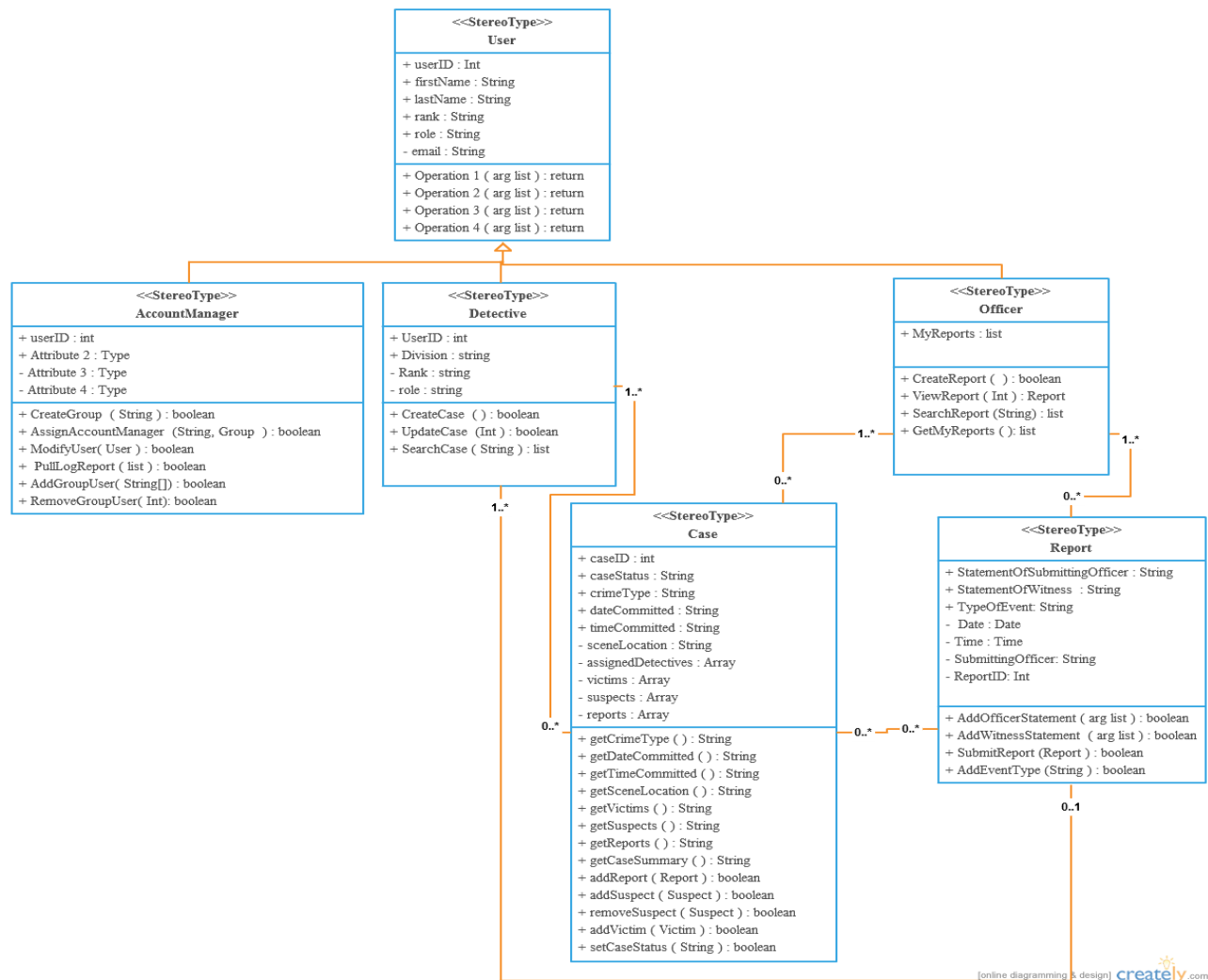


2.2 Product Functionality

The system is expected to perform the following functions:

- Log reports using speech to text mechanisms.
- Correlate case records based on similarity, data analysis and pattern recognition.
- Generate alerts on discovered patterns.
- Provide secure access via user authentication and encrypted transmission.
- Generate and maintain a log of communications and other user activity for forensic and administrative purposes.
- Allow for creation of groups/sub-divisions.
- Enable the adding of media content such as images and audio files to the reports
- Enable broadcast, group, and individual messaging/alerts
- Facilitate the creation and modification of records in a database through speech to text converter.

Below is a class diagram of L.I.V.E.:



2.3 Users and Characteristics

The intended users of the system are government employees within law enforcement and legal services agencies. There are multiple user types in this community including System Administrators, Account Managers, Web Access (Internet browser) Users and Mobile Device (Android) Users.

- System Administrator – This user will manage the creation of users and user groups and ensuring the correctness in their information. The will also be tasked with the assignment of Account Managers to oversee groups.
- Account Manager – Account managers will operate at the departmental level and have the primary responsibility of overseeing their assigned user groups which includes assigning detectives to cases, maintaining and deleting user accounts, adding and removing users from groups. Account Managers will have a subset of the access control and permissions granted to System Administrators and are required to have knowledge only as it relates to their role and providing assistance to new account holders.
- Detective – This user will be given the privilege of accepting or declining cases along with creating cases, updating cases, creating reports and also making updates to them.
- Officer - This user will be able to log reports of investigations, arrests and other offenses.

2.4 Operating Environment

- 512 Gigabytes of RAM
- 1.87 Gigahertz Central Processing Unit
- 500 Megabytes of Hard Disk space
- 1.5 Megabit/second ADSL Lite network connection
- Android device
- Android OS version 2.2

2.5 Design and Implementation Constraints

- 1) Access to the legal documents that dictate the documentation and reporting process for legal matters
- 2) The accessibility to the system currently being used as the limits brought about by developer's status as a civilian.
- 3) Increasing user numbers and dataset are assumed to have no impact on search time.
- 4) User access will be granted based on the user's role/position in the customer's organisation.
- 5) Android development process will have to be learned before the implementation of the android version of the system is achieved.
- 6) Due to the short timeframe given for the development of the system, some functions may be left out of the initial implementation.

2.6 User Documentation

Online help will be made available for all users of the system in the form of tutorials on the application website. A link to the help content will be built into the mobile application to redirect Android users to the site. The tutorials will consist of text combined with screenshots to illustrate the solutions to the issues encountered.

2.7 Assumptions and Dependencies

1. It is assumed that the client may have all the required data in an existing database but does not have an implemented solution that processes and harnesses its full potential (no detection and/or computational analysis of trends patterns).
2. It is assumed that the customer's organisation has specific methods of identifying each user and all users are provided with personal work emails.
3. It is assumed that the customer of the system will provide the option of integrating 1 week training timeframe within their already existing training process for users to familiarise, utilise and develop the skill set needed to correctly navigate the system.

3 Specific Requirements

3.1 External Interface Requirements

3.1.1 User Interfaces

- Please refer to section 3.2 for details on the different interfaces that will be defined.

3.1.2 Hardware Interfaces

- Keyboard
- Mouse
- Monitor
- Printer
- Android Device
- Microphone
- CMU Sphinx

3.1.2.1 Internet/Web Browser Access via Desktop/Laptop Computers

The hardware components of the UI required for interaction with the system are a monitor (attached or built in), keyboard, pointing device (mouse/trackpad) and image scanner. The keyboard will be the primary input device for this mode of interaction and the pointing device is used for navigation.

3.1.2.2 Android Mobile Devices

Android users will interact with the system using the touchscreen built into the device. They will access and navigate the application by direct manipulation of screen elements using the same principles as other applications on the device.

3.1.2.3 Other Tablet Computers

Users of other types of tablet computers running different operating systems are also able to use the system. As with Android users, they too will gain access via direct manipulation of screen elements on a touchscreen. The difference is that these users will have to use an internet browser application to access the web version of the system. By doing so, they share somewhat similar user experiences with desktop/laptop users.

The aim of the design is to achieve consistency and intuitiveness. The user should not have to guess what each button/icon does, he/she should be able to navigate through the system with ease. Good user interface design provides for completing the task at hand without drawing unnecessary attention to it. The user interface requirements include:

- Intuitiveness- Design that is consistent, predictable easy to understand and straight-forward
- Aesthetics- Design that is sufficiently appealing, inviting without appearing cluttered
- Feedback- Design that shows the result of the user actions in a simple unobtrusive way
- Error Tolerant- Design that accounts for when users make mistakes and allows for quick and easy corrections

3.2 Functional Requirements

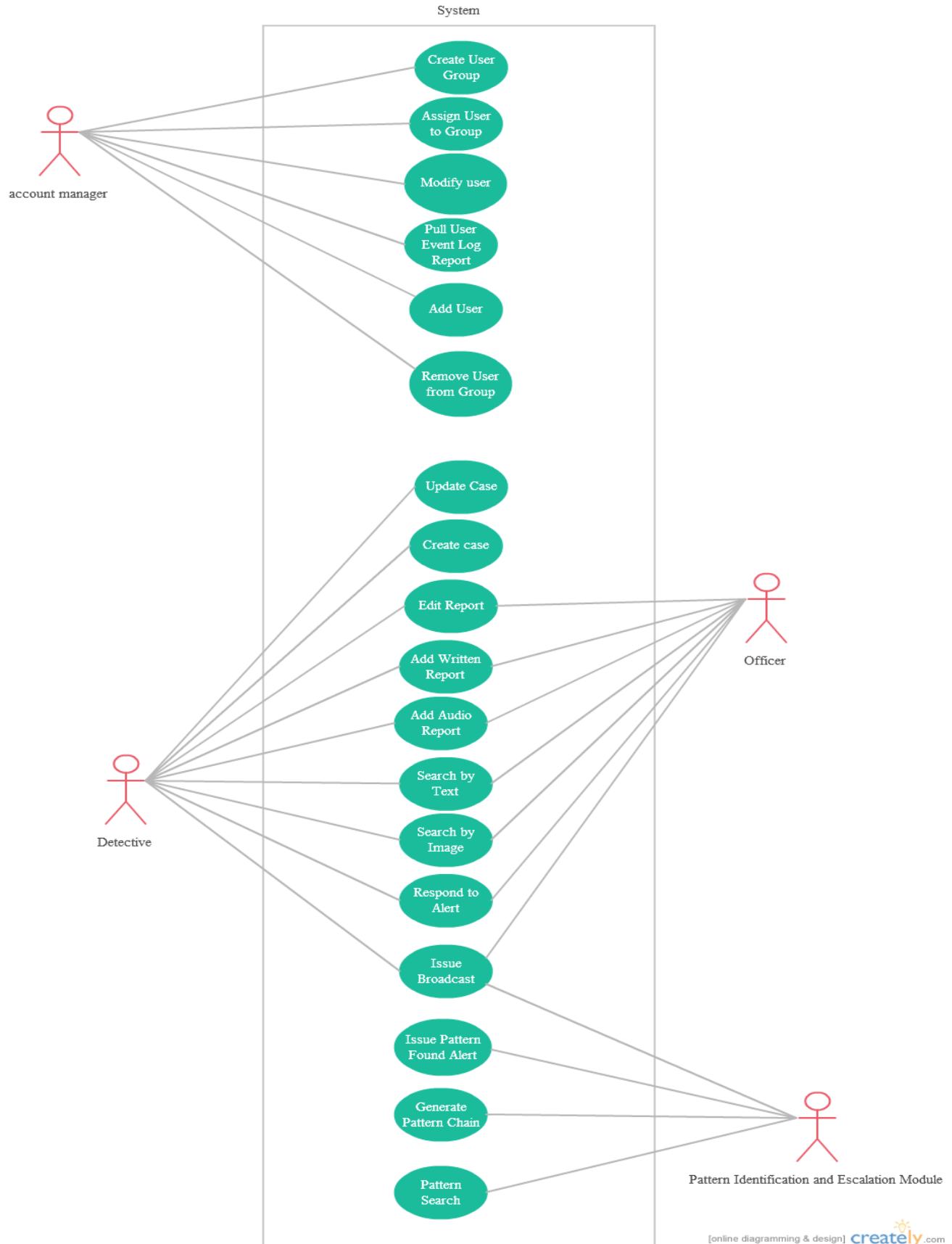
#	Feature	Functionality	Description
1	User Login	There shall be an available GUI for user login	<ul style="list-style-type: none"> -User will be required to login when app is opened -The User-ID shall be unique in the database. -User will be required to enter a User-ID and password. -If user enters the wrong information , it should issue the user an alert to indicate wrong input information. -On successful login, user will be directed to a screen with his available functions.
2	User Logout	There shall be an option provided to logout of the system	Only if user is logged into the website, then logout tool/button should be visible, otherwise it shall be void.
3	Log Report	There shall be a tool with its required GUI that provides the user with the option to log reports through <ol style="list-style-type: none"> 1. a text entry menu (Add Written Report) 2. a audio input method (Add Audio Report) 	There shall be a feature that offers Officers and Detectives the option to add reports through a written or audio interface and saved in the system.
4	Edit Report	There shall be a tool with its	Detectives and officers should be

		required interface that allow a user the option of editing an already existing report	able to edit reports after submitting
5	Create Case	There shall be an available GUI which gives the user the option to create a case	-Only detectives shall be able to create a case to the system. -Each case shall have a unique ID -This will provide a list of reports for the case
6	Update Case	There shall be an available GUI which gives the user the option to update an already existing case.	Only detectives shall be provided with the option to update a case.
7	Search	There shall be a GUI which provides users with the option to search case and report details	User shall be able to select different criteria to limit their search. Upon search, database will be queried and results displayed on screen
8	Issue Broadcast	There shall be a GUI which offers users the ability to broadcast messages to other users or groups	Officers and detectives shall be able to create a broadcast message and send it to a group of users or to a specific user.
9	Add User	There shall be a GUI which offers account managers the option to add users	-An account manager shall be able to add a new user to the system. -User's role shall also be defined
10	Create User Group	There shall be a GUI which offers account managers the option to create user groups	An account manager shall be able to create create a new user group.
11	Assign User to Group	There shall be a tool which offers account managers the option to assign users to groups	An account manager shall be able to add a user to a group created.
12	Remove User from Group	There shall be a tool which offers account managers the option to remove users from groups	-An account manager shall be able to remove a user from a group. -User's access role within group will also be removed
13	Modify user	There shall be a GUI which	An account manager shall be able

		offers account managers the option to modify users details	to modify a user rank, role or disable a user's login ability.
14	Pull User Event Log Report	There shall be a GUI which offers account managers the option to generate reports of various user events	An account manager shall be able to view officers and detectives, cases and report logs. - Account manager Shall be able to save or export the log results for specific or a range of officers, cases, detectives or reports .
15	Pattern Search	There shall be a feature of the system that allows it to check for patterns and similarities between data sets	-The system shall utilize and build a set of keywords for searching -Datasets will be analysed for keywords and will be linked based on a range of keywords identified in them.
16	Generate Pattern Chain	There shall be a feature of the system that allows it to generate a chain linking system for patterns and similarities between data sets.	The system shall bundle identified cases with matching keywords in a format that shows the link between them.
17	Issue Pattern Found Alert	There shall be a feature of the system that allows it to issue alerts to the relevant parties when patterns and similarities between data sets are identified	The system shall alert officers and detectives related to cases with identified patterns.

3.3 Behaviour Requirements

3.3.1 Use Case View



4 Other Non-functional Requirements

4.1 Performance Requirements

4.1.1. Performance

In addition to the speed of accessing information, the system must be reliable and convenient to the user.

- ❖ The System shall provide results to user queries within an acceptable time frame not factoring the external components that affect the processing.
- ❖ The login process shall take no longer than 4 seconds to authenticate the user
- ❖ System should be accessible from any point with sufficient internet access or access to the application for any authorised user.

4.2 Safety and Security Requirements

4.2.1. Security

For this system which is a web/server based system, security will be of high importance as users will be inputting data which will be stored to the server. Security will be implemented at various checkpoints in the system, beginning with user login and authentication. Both the web GUI as well as the Android app GUI shall require the user at first screen to login. The user must enter a valid username and password which the system will verify and if validated, will grant access to the wider system. Data communications between the client and the server will be encrypted for additional security and confidentiality. The system shall ensure that the connection between the client and server is authenticated before any data is transmitted. A timeout feature shall be implemented within the client application that will close the application after a specified time has elapsed without activity, requiring the user to login again in order to continue using the app.

4.3 Software Quality Attributes

4.3.1. Accessibility

Another non-functional requirement is accessibility to information. Information will be stored locally so in the event that there is not a connection to the internet, users will still be able to access basic information prior to the disconnection of the internet.

4.3.2. Mobility

Mobility is another non-functional requirement to consider as the application will be accessible from multiple platforms whether it is smart phones, tablets, laptops etc (limited to android and Web). As long there is an internet connection readily available the user will have access

5 Other Requirements

5.1 Method

The system was developed using the Waterfall model of software development. This model was chosen because the system is relatively small and implementation can be executed fairly quickly. The waterfall model provides a step by step approach to software development that provides a guide through which analysis, design, coding, testing and maintenance can be achieved. Waterfall model was ideal for this project because the core requirements are well understood; members of the team are able to design more completely and carefully since they have an understanding of the requirement at hand. The activities included conception, requirements definition, analysis, UI design, testing and deployment.

6 Implementation

Implementation for LIVE is in line with the functional requirements and use cases for the system described above.

- The user shall login
 1. The user shall enter correct user information in fields (email and password)
 2. The user shall click login
 3. Access will be given if login is correct, rejected otherwise and prompts user to re-enter login
- The user shall input a new crime report/Person Profile
 1. The officer selects "Edit report" or "Edit Profile" from the menu
 2. System displays form to accept the data for the new report/profile
 3. The officer enters the appropriate data into the form and clicks save. In the event that invalid data is entered, the system catches the error and redirects the user back to the form with appropriate error messages

4. The system processes and stores the information entered and displays a success message. For the report, it is processed by the daemon which checks for fields similar to previously added records
 5. The system generates an alert if matches are found by daemon
- The user shall input and edit profiles/report
 1. User searches for report from the database
 2. The system displays the report in edit mode
 3. User makes adjustments and submits the form
 4. The system validates processes and updates the data. In the event that invalid data is entered, the system catches the error and redirects the user back to the form with appropriate error messages
 5. System indicates success and redirects to the general view

6.1 Challenges

From the early stages of development it was realised that each team member has a different style of coding and as such adjustments had to be made to allow for smooth, consistent code. The use of koding.com as a platform aided in the solution as it allowed members to work in a common environment so as to improve team cohesion.

Another challenge to the development team was implementing the initial graphical user interface in mind as well as the sphinx (voice to speech) system. The team had problems getting the flasks used in github to work with each other to give the final design desired. This was a major setback and in the interest of time, the team decided to go with an alternate user interface for LIVE.

Working periods was another challenge that the development team had to overcome members of the team were not always available at the same time as half the team work in the day and the other half in the night, however the team was able to offset the difficulty and found a middle ground via Google Hangouts and other mediums to work effectively.

LIVE was intended to be an upgraded version of the current C.I.M.S system used by the JCF.

6.2 Testing

6.2.1 Basic security and input testing

Developers tested the system for input errors and any loopholes such as password authentication etc

6.2.2 Data queries and events

Queries on the database to ensure the data that was retrieved was accurate

6.2.3 Usability Testing

Developers tested the interface of the system to see how easy to use, intuitive and error tolerant the system was to ensure that the design was in line with the user interface requirements

6.3 Design tradeoffs

6.4 Design Scalability


Scalability for our system is largely based on the web server handling increased requests(input and output).

Flask apps have a decomposable structure where modules can be added and removed without affecting latency and uptime. It all depends on the architecture used. With our architecture and or component model, it allows for ease in terms of app decomposition which works more easily when it comes to scalability

7 Results

L.I.V.E.

HOMEABOUTCONTACTPROFILE



Report Form

Status

Diary Entry Number

Location of Offence

Significant Landmark Nearby

Offence

Offence Code


Reported Date & Time

Name of Victim

Address of Victim

L.I.V.E.

HOMEABOUTCONTACTPROFILE



Contact

Name

Email

Subject

Message

Send

L.I.V.E.

HOMEABOUTCONTACT





Legal Investigations Virtual Environment

This system aims to replace the current process and manual system used by the JCF for logging reports, case investigations, records and efficiency.

L.I.V.E. is geared at providing support for and increasing the efficiency of law enforcement, legal and investigative operations and services.

It also provides an analytic self search feature which identifies trends between data objects and reports them to the appropriate users.





Step One

Learn More



Step Two

Learn More



Step Three

Learn More

8 Conclusion

8.1 Assessment of Degree of Success

The current implementation solves the problem that was described in the Introduction of this document. The problem was that officers did not have an effective way to record and store crime reports nor a person's profile and also to search for the required files and identify matching reports at a reasonable timeframe for the officers to be fully effective and time efficient. LIVE facilitates this by having a secure way for officers to record these files and search these files. It makes the search more time efficient with incorporating the use of a daemon running in the background that traverses the database for matching reports and generates an alert if any are found.

8.2 What Could Have Been Done Differently

The files could have been encrypted for a higher level of security as these are official police records. A facial recognition system could have been included to allow for searching of persons of interest against the police database.

8.3 Extensions

Due to time constraints the implementation of certain features were limited. Primarily the Sphinx voice to speech feature as well as tying the system with its intended android version.

8.4 Lessons

This project was quite a journey for the DroidArmy team and as such many lessons were learned from the experience including:

- Having regular face to face and online meetings are crucial to successfully completing a group project. Due to our diverse schedules the group members had to come up with creative ways with how we met and discussed ideas and worked together.
- Working with a framework as opposed to a programming language has both positives and negatives. Two major benefits would be the time that can be saved when building an application and added security features that have been built-in and pre-configured. A disadvantage of using a particular framework is that the learning curve may be quite difficult and very time consuming.
- Members selected to be a part of the development team have to first be vetted to confirm their competence and availability to complete the required work.